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UNITED STATES DEPARTMENT OF AGRICULTURE
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SOYBEAN CYST NEMATODE SITUATION IN THE UNITED STATES [1/]

By Joseph F. Spears

On November 12, 1954, Dr. F. P. Cullinan, Chief, Horticultural Crops Research Branch, forwarded a memorandum to Dr. W. L. Popham, then Chief, Plant Pest Control Branch, advising that a new cyst-forming nematode had recently been reported damaging soybeans in North Carolina.

In order to determine its potential seriousness to the rapidly growing soybean industry a study was initiated to develop further information concerning this newly-discovered pest. Following a discussion with agricultural officials in North Carolina it was decided to hold a conference on December 6, 1954, at the Plant Pathology Building of the North Carolina State College of Agriculture in Raleigh.

This conference was attended by representatives of the North Carolina State College of Agriculture, North Carolina State Department of Agriculture, and Field Crops Research Branch, Plant Pest Control Branch of the U. S. Department of Agriculture. At this meeting it was brought out that on or about August 7, 1954, a grower of soybeans on the Castle Hayne Loop Road, New Hanover County, had observed severe damage to his soybean field and had called it to the attention of Dr. N. N. Winstead of the North Carolina State College of Agriculture Branch Station Vegetable Research Laboratory in Castle Hayne. An examination of the soybean roots in the field in which damage was observed revealed a considerable number of cyst nematodes.

Cysts were forwarded to Dr. J. N. Sasser, Department of Plant Pathology (Nematode Diseases) at Raleigh, who identified them as a species of Heterodera. Cysts were in turn forwarded to Mr. A. L. Taylor of the Nematology Section at Beltsville, Maryland, who identified them as Heterodera glycines Ichinohe.

The discovery of the soybean cyst nematode in North Carolina marked the first time that this pest has been reported outside of Japan, Korea, and Manchuria where it has been known to cause damage to soybeans since 1915. On January 4, 1955, the State Entomologist of North Carolina issued a notice addressed to plant pest control officials in the 48 States, announcing the finding of soybean cyst nematode in North Carolina.

On February 21, 1955, a meeting was held in Washington, at which time Dr. J. N. Sasser presented the status of the soybean nematode infestation in North Carolina to representatives of the Plant Pest Control Branch and the Nematology Section of the Horticultural Crops Research Branch. On March 14 and 15 the soybean

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1/For presentation at public hearing to consider quarantine on account of the soybean cyst nematode - January 31, 1957.

nematode situation in North Carolina was discussed with Dr. G. Steiner and Mr. A. L. Taylor of the Nematology Section of the Horticultural Crops Research Branch and Drs. Kreitlow and Johnson of the Forage and Range Section of the Field Crops Research Branch.

On April 5, 1955, a conference was held at the North Carolina College of Agriculture, Raleigh, at which time a tentative research and survey program was discussed. The meeting was presided over by Dr. R. L. Lovvorn, Director of Research, North Carolina State College Experiment Station, Raleigh. This meeting was attended by representatives of the Plant Pest Control Branch, Horticultural Crops Research Branch and North Carolina Agricultural officials and agricultural Extension workers.

As a result of this meeting a plan for cooperative Federal-State program was developed. On April 26, survey and laboratory teams from the golden nematode project were sent to Castle Hayne to establish a laboratory and to conduct surveys for the pest. Survey plans call for : (a) Intensive survey in the communities in which infestation is known to be present, (b) spot survey of the surrounding areas ranging outward perhaps 50 miles, (c) intensive survey of areas known to be exposed to infestation as a result of traffic from the infested area.

Host testing at that time was the only means by which positive identification could be made of the soybean cyst nematode because of the similarity of this cyst with those of Heterodera trifolii and schachtii. Dr. Hedwig Herschmann of the North Carolina State College of Agriculture later worked out in a series of meticulour morphological studies a means by which the soybean cyst nematode can be distinguished from closely related forms. However, identification is still difficult and requires careful study.

During 1955 the Plant Pest Control Branch issued a series of reports relating to the investigations being conducted. On July 1, 1955, the Branch reported on the progress of work in a memorandum to State regulatory officials in the principal soybean-producing States and called their attention to the need for survey information on the nematode in the commercial soybean areas. The memorandum stated in part - 'In carrying out its responsibilities the Plant Pest Control Branch has reviewed the situation with the Horticultural Crops Research Branch and Field Crops Research Branch, Agricultural Research Service, and it is now desirable that the matter be brought to the attention of regulatory officials, plant pathologists and others concerned with the culture of soybeans in the important producing areas. If workers in your State concerned with the culture of soybeans, in the course if their regulatory duties can be observant of unexplained damage to soybean plantings, such observations can be of great help in locating possible sites of infestation. Should soybeans with unexplained damage be found and if it is suspected that the soybean cyst nematode may be the cause, the locations should be reported promptly to us. Provision is being made for an intensive survey of such fields or areas.' Following the memorandum, arrangements were made to have Branch representatives call on State Regulatory and Extension representatives and Experiment Station workers in the more important soybean-producing States, at which time details were worked out for handling of samples and reports of suspicious fields or areas.

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The cooperative Federal-State survey and investigations in North Carolina continued. Infestations in the Castle Hayne area were found in many cases to be heavy. In most of the fields it was relatively easy to find live cysts attached to the roots of soybean plants, and by the end of 1955, 770 acres in 50 properties had been confirmed. Nonviable cysts had been found on an additional 157 acres in 20 properties. Special surveys were conducted in seven southeastern counties in the State of Virginia and in four counties in northeastern South Carolina. However, no evidence of infestation was found.

It was important to determine means of spread. Samples were taken of the soil and dust clinging to two combines that were used to harvest infested fields. Per pound of soil taken from these machines, an average of 4,156 cysts were recovered, of which 16.5 percent contained eggs with viable larvae. Inspectors then began to check custom machinery that was used outside of the immediate areas of Castle Hayne. This lead to 91 infested acres in three properties north of the county line in Pender County. Other means of spread included wind (by which the pest was moved more than 200 yards in one instance tested), water, animals, farm workers, machinery, used burlap sacks and containers, local traffic, or any means capable of spreading small amounts of infested soil.

As of January 1957, soybean cyst nematode had been found on 1,420 acres in New Hanover County and 373 acres in adjacent Pender County. Land utilization of the 1,793 acres infested is as follows: Bulb production, 17 percent, bulbs grown for cut flowers, 17 percent, and soybeans grown for seed, beans, and hay, 66 percent. One significant finding during 1956 was the discovery of the soybean cyst nematode attacking snapbeans near Castle Hayne.

Following a hearing of interested parties in Raleigh on March 25, 1956, the North Carolina State Department of Agriculture issued a quarantine to regulate movement of potential carriers of the pest from infested areas and premises. (Copy submitted for the record.)

Requests for infestation regarding the soybean cyst nematode situation in North Carolina increased materially and a special report was issued by the Agricultural Research Service covering what we knew about the overall soybean cyst nematode situation, including survey, regulatory, control, and research aspects of the problem. This information was released in Soybean Cyst Nematode Special Report, Agricultural Research Service, No. 22-29, August 1956. At the time this report was issued none of the States had reported the presence of the soybean cyst nematode or symptoms that could not otherwise be explained.

On November 30, 1956, Mr. H. L. Bruer, State Entomologist and Plant Pathologist, of the Tennessee Department of Agriculture, announced that the soybean cyst nematode had been found in Lake County, Tennessee. This nematode was first found in a sample taken by Mr. James Epps of the Western Tennessee Experiment Station, Jackson, Tennessee, from a commercial field of soybeans just south of Ridgely, Tennessee. These findings were confirmed by Mr. A. L. Taylor, Nematology Section, on November 29 when he examined specimens submitted from Tennessee. Immediately upon identification of this nematode, arrangements were made for a cooperative survey to determine the extent of infestation, and personnel were sent from the Plant Pest Control Branch's soybean cyst nematode

laboratory in North Carolina.

On December 10 a conference was held, including representatives of the Tennessee State Department of Agriculture and the Tennessee Agricultural Experiment Station and the Plant Pest Control Branch. At this meeting it was decided to continue with the survey as long as weather conditions would permit and to collect samples from commercial facilities in the county. This would include elevators, cleaners and crushing mills to determine what hazard might exist in the movement of beans, especially certified seed, from these facilities.

The Tennessee State Department of Agriculture immediately started considering formal regulatory action, and Dr. J. O. Andes, Head, Department of Plant Pathology, Agricultural Experiment Station, Knoxville, Tennessee, began formulating a research program.

As of January 1957, infestations of soybean nematode in Tennessee had been found on approximately 2,270 acres, all in Lake County. There is one important difference between the infestation here and that in North Carolina. This infestation is in the heart of a large commercial soybean-growing area. Tennessee will grow this year approximately 300,000 acres of soybeans. Lake County alone grows approximately 40,000 acres; and in adjacent Obion County, 48,000; and Dyer, 58,000 acres. A large quantity of beans from this area are certified for seed. These three counties are located in the Mississippi Delta, with a typical delta soil which is well adapted to large-scale farming operations consisting chiefly of soybeans and corn. However, some alfalfa, corn, and winter grain are grown in this section. In the Finley community in western Dyer County some spinach, lima beans, and other vegetables are grown. An infested soybean field has been found between the levee and the Mississippi River where flooding occurs. There are no root crops or nursery plants grown commercially in the present infested area in Lake County.

Following the discovery of the soybean cyst nematode in Tennessee, an invitation was sent to the nearby States to send representatives to receive training in survey procedures. Branch and State representatives attending this meeting were from Tennessee, North Carolina, Missouri, Iowa, Illinois, and Ohio. Temporary field headquarters was established in a public school building in Ridgely, Tennessee, in Lake County.

There is considerable traffic between the soybean area in Tennessee and the adjacent "bootheel" section of nearby Missouri. On December 5, soil samples were taken from six fields in Pemiscot County, Missouri, by Mr. A.H. Hagge of the Plant Pest Control Branch and Mr. Virgil Owens, Assistant State Entomologist of Missouri. According to arrangements made with Tennessee State officials, these samples were transported to Ridgely and processed, when cysts were recovered and identified by Mr. A. L. Taylor, Head, Nematology Section, Horticultural Crops Research Branch at Beltsville, Maryland, on December 12, 1956, as soybean cyst nematode.

Additional random surveys in the area have revealed infestations on a total of nine farms involving 850 acres, all in Pemiscot County, Missouri.

Following discovery of this nematode in the State of Missouri, Governor James T. Blair, then Governor-Elect, called a meeting at the State Capitol in Jefferson

City on December 21, 1956. This conference was attended by the Director of Experiment Station, Director of Extension, Head of the Department of Entomology, Extension Entomologist, Acting Director of the Missouri State Department of Agriculture, the State Entomologist, other S ate officials, and representatives of the Plant Pest Control Branch. Plans were made for the Experiment Station to develop research work on the nematode; the Extension Service to keep the county extension agents and vocational agricultural inspectors properly informed, the State Department of Agriculture to make further surveys in southeastern Missouri to delimit infested areas as soon as possible; the Extension survey entomologist to assist in the detection of the nematode in counties in and beyond the infested area. Plant Pest Control Branch is assisting the State in this preliminary survey.

The soybean industry in the United States is a rapidly growing business. It is a billion dollar industry. Soybean production in 1956 reached an all-time high. The crop is estimated at 456 million bushels, 22 percent above the previous record of 374 million bushels produced in 1955. Soybean acreage in the United States also reached a new peak in 1956, a total of 22.3 million acres was planted for all purposes, compared with 20 million acres in 1955. Of this acreage, nearly 21 million, or 94 percent, was harvested for beans. This is the highest percentage for beans of record. The north-central States produced about 83 percent of the total United States production. (USDA Crop Production Report, Annual Summary, 1956).

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